



ILLINOIS VALLEY COMMUNITY COLLEGE

**COURSE OUTLINE**

**DIVISION:** Natural Sciences Business

**COURSE:** AGR 1002 Introduction to Agricultural Mechanics  
(IAI AG 906)

Date: 4/12/2018

Credit Hours: 3

Prerequisite(s): None

Delivery Method:  **Lecture** 2 Contact Hours (1 contact = 1 credit hour)  
 **Seminar** 0 Contact Hours (1 contact = 1 credit hour)  
 **Lab** 2 Contact Hours (2-3 contact = 1 credit hour)  
 **Clinical** 0 Contact Hours (3 contact = 1 credit hour)  
 **Online**  
 **Blended**

Offered:  **Fall**  **Spring**  **Summer**

IAI Equivalent –**Only for Transfer Courses**-go to <http://www.itransfer.org>: AG 906

**CATALOG DESCRIPTION:**

This course is designed to introduce students to the various aspects of agricultural mechanics. The content of the course is chosen to give an overview of several technical areas that compromise agricultural mechanization.

## GENERAL EDUCATION GOALS ADDRESSED

*[See last page for Course Competency/Assessment Methods Matrix.]*

### Upon completion of the course, the student will be able:

*[Choose up to three goals that will be formally assessed in this course.]*

- To apply analytical and problem solving skills to personal, social, and professional issues and situations.
- To communicate successfully, both orally and in writing, to a variety of audiences.
- To construct a critical awareness of and appreciate diversity.
- To understand and use technology effectively and to understand its impact on the individual and society.
- To develop interpersonal capacity.
- To recognize what it means to act ethically and responsibly as an individual and as a member of society.
- To recognize what it means to develop and maintain a healthy lifestyle in terms of mind, body, and spirit.
- To connect learning to life.

### EXPECTED LEARNING OUTCOMES AND RELATED COMPETENCIES:

*[Outcomes related to course specific goals. See last page for more information.]*

### Upon completion of the course, the student will be able to:

1. The student will be able to create and complete a safety evaluation report.
2. The student will be able to recommend and justify safe work habits.
3. The student will be able to calculate area in acres and square feet.
4. The student will be able to perform a profile and differential leveling exercise.
5. The student will be able to formulate and write a recommendation for an agricultural drainage system.
6. The student will be able to illustrate series and parallel circuits.
7. The student will be able to select the correct electrical tools and hardware and construct an electrical circuit from an electrical wiring diagram.
8. The student will be able to prepare a construction project plan.
9. The student will be able to demonstrate safe tool use.
10. The student will be able to identify parts of the small engine.
11. The student will be able to demonstrate the disassembly and assembly process of small engines.
12. The student will be able to illustrate and explain engine operation.
13. The students will be able to describe the theory of hydraulic and pneumatic systems operation.
14. The student will be able to develop and complete a maintenance schedule for agriculture equipment including powered equipment and implements.
15. The student will be able to calculate force and pressure of single and double acting hydraulic cylinders.

## MAPPING LEARNING OUTCOMES TO GENERAL EDUCATION GOALS

[For each of the goals selected above, indicate which outcomes align with the goal.]

<b>Goals</b>	<b>Outcomes</b>
First Goal	
<p>To apply analytical and problem solving skills to personal, social, and professional issues and situations.</p>	<p>The student will be able to create and complete a safety evaluation report.</p> <p>The student will be able to calculate area in acres and square feet.</p> <p>The student will be able to perform a profile and differential leveling exercise.</p> <p>The student will be able to illustrate series and parallel circuits.</p> <p>The student will be able to prepare a construction project plan.</p> <p>The student will be able to identify parts of the small engine.</p> <p>The student will be able to demonstrate the disassembly and assembly process of small engines.</p> <p>The student will be able to illustrate and explain engine operation.</p> <p>The students will be able to describe the theory of hydraulic and pneumatic systems operation.</p> <p>The student will be able to develop and complete a maintenance schedule for agriculture equipment including powered equipment and implements.</p> <p>The student will be able to calculate force and pressure of single and double acting hydraulic cylinders.</p>
Second Goal	
<p>To connect learning to life.</p>	<p>The student will be able to recommend and justify safe work habits.</p> <p>The student will be able to formulate and write a recommendation for an agricultural drainage system.</p> <p>The student will be able to select the correct electrical tools and hardware and construct an electrical circuit from an electrical wiring diagram.</p> <p>The student will be able to demonstrate safe tool use.</p>
Third Goal	

## **COURSE TOPICS AND CONTENT REQUIREMENTS:**

- I. Safety
  - a. Introduction
  - b. Everyday safety concerns
  - c. Safe work habits
- II. Environmental Technology Systems
  - a. Land Measurement
    - i. Measure distance using pacing, taping, and an odometer wheel
    - ii. Calculate area in acres and square feet
    - iii. Legal descriptions
  - b. Landscape Surveying
    - i. Note taking for surveying
    - ii. Using a hand-level
    - iii. Setting up and leveling the transit
    - iv. Using a self-leveling transit
    - v. Profile leveling
    - vi. Differential leveling
    - vii. Laser levels
  - c. Agricultural drainage systems
    - i. Waterway construction
    - ii. Installing and maintaining field drainage systems
    - iii. Filter strips, terraces, and wetlands
- III. Agricultural Electrification and Application
  - a. Electrical Circuits
    - i. Electrical Safety
    - ii. Identify electrical wiring tools
    - iii. Identify electrical wiring materials
    - iv. Electrical diagramming
    - v. Electrical theory
    - vi. Ohm's, Amperage, Wattage
    - vii. Series and Parallel circuits
    - viii. Wire series and parallel circuits
    - ix. National Electrical Code
  - b. Electric Motors
    - i. Identify the parts of the electric motor
    - ii. Routine maintenance
    - iii. Assembly
    - iv. Types of electric motors
    - v. Basic operation
- IV. Agricultural Structures
  - a. Designing Agriculture and Horticulture structures
    - i. Identify types of agricultural and horticultural structures
    - ii. Identify parts of the building
    - iii. Planning a construction project
    - iv. Creating a project drawing
    - v. Bill of materials

- vi. Stock cutting lists
  - vii. Dead and live loads
  - viii. Identify building materials
  - b. Constructing Agriculture and Horticulture Structures
    - i. Identification of hand and power tools
    - ii. Power tool safety
    - iii. Tool maintenance
    - iv. Safe tool use
- V. Agricultural Power and Machinery
- a. Gasoline Engines
    - i. Identify small gas engine parts
    - ii. Identify small gas engine tools and equipment
    - iii. Measuring devices
    - iv. Theory of engine operation
    - v. Compression system
    - vi. Fuel systems
    - vii. Ignition systems
    - viii. Cooling systems
    - ix. Troubleshooting
    - x. Maintaining small gas engines
  - b. Hydraulic and Pneumatic Systems
    - i. Safety
    - ii. Force, pressure, flow, and speed
    - iii. Pascal's Law
    - iv. Hydraulic pump operation
    - v. Hydraulic cylinders operation
    - vi. Hydraulic valves
    - vii. Single acting and double acting cylinders
  - c. Agricultural Machinery and Equipment
    - i. Maintenance schedules
    - ii. Identifying types and uses of machinery and equipment
      - 1. Tractors, combines, tillage, fertilizer, ect.
    - iii. Operating agricultural equipment
    - iv. Calibrating agricultural equipment
    - v. Adjusting agricultural equipment

**INSTRUCTIONAL METHODS:**

- Lecture
- Discussion
- Laboratory Exercises
- Project
- Group work
- Homework assignments
- Field trips

**INSTRUCTIONAL MATERIALS:**

Koel, L., G.A. Mazur, B.J. Moniz, and R.B. Radcliff. 2013. Agricultural technical systems

and mechanics. American Technical Publishers. ISBN: 978-0-8269-3663-9.

Radcliff, R.B. 2016. Small engines. 4<sup>th</sup> Edition. American Technical Publishers. ISBN: 978-0-8269-0033-3.

Hoerner, H.J. 2007. Basic electricity and practical wiring. Hobar Publications. ISBN: 978-0-913163-42-9.

Field, H.L. 2012. Landscape surveying. 2<sup>nd</sup> edition. Cengage Publishers. ISBN: 9781111310608.

### **STUDENT REQUIREMENTS AND METHODS OF EVALUATION:**

A= 90-100

B= 80-89

C= 70-79

D= 60-69

F= 0-59

Exams and Quizzes – 50%  
Laboratory Exercises – 30%  
Homework Assignments – 20%

### **OTHER REFERENCES**

Field, H., and J. Long. 2018. Introduction to Agricultural Engineering Technology. Springer International Publishing. ISBN: 978-3-319-69678-2.

Illinois Agricultural Education Library – [www.mycaert.com](http://www.mycaert.com)

University of Illinois ITCS Instructional Materials:

MDS320- Hardware and Fastener Identification

MDS340- Hand Tool Identification

U3009a- Using the Carpenter's Square

U3045- Metal Roofing and Siding for Farm Structures

U3051b- Planning a Construction Project

U3055- Lumber: Grading, Selecting, Buying, Using, and Storing

DT422a- Rafter Marking

DT423a- The Steel Square

U3003c- Planning for Electrical Wiring

U3016a- Electrical Wiring Procedures

Z3016b- Electrical Wiring Exercises

U3038- Using Three-Phase Electrical Power on the Farm

U3057- Electrical Controls in Agriculture

U3058- Selecting Electric Motors for Use in Agriculture

U3059- Installing and Caring for Electric Motors in Agriculture

U3061- Selecting Equipment for Electrical Installations

DT400a- Electric Wiring Diagramming

MDS300- Electric Wiring Hardware Identification

T440- Basic Principles of Hydraulics  
U3014- Small Engines- Principles of Operation, Trouble-Shooting and Tune-Up  
U3019- Small Engines – Repair and Overhaul  
U3020- The Two-Cycle Engine  
U3072- Small Gasoline Engine Maintenance  
DT486- Small Gas Engine Parts Identification  
DT488- Small Gas Engine Operating Principles  
U2042- Land Surveys and Descriptions  
U3010b- Surveying in Agriculture  
DT310- Introduction to Surveying

# Course Competency/Assessment Methods Matrix

(Dept/# Course Name)	Assessment Options																																		
For each competency/outcome place an "X" below the method of assessment to be used.	Assessment of Student Learning	Article Review	Case Studies	Group Projects	Lab Work	Oral Presentations	Pre-Post Tests	Quizzes	Written Exams	Artifact Self Reflection of Growth	Capstone Projects	Comprehensive Written Exit Exam	Course Embedded Questions	Multi-Media Projects	Observation	Writing Samples	Portfolio Evaluation	Real World Projects	Reflective Journals	Applied Application (skills) Test	Oral Exit Interviews	Accreditation Reviews/Reports	Advisory Council Feedback	Employer Surveys	Graduate Surveys	Internship/Practicum /Site Supervisor Evaluation	Licensing Exam	In Class Feedback	Simulation	Interview	Written Report	Assignment			
	Direct/ Indirect	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	I	I	I	I	D	D									
The student will be able to create and complete a safety evaluation report.				X	X			X	X				X	X	X			X		X														X	X
The student will be able to recommend and justify safe work habits.			X	X	X	X		X	X				X	X				X		X													X	X	
The student will be able to calculate area in acres and square feet.				X	X			X	X				X	X				X		X															X
The student will be able to perform a profile and differential leveling exercise.				X	X			X	X				X					X		X															X
The student will be able to formulate and write a recommendation for an agricultural drainage system.				X	X	X		X	X				X	X				X		X													X	X	
The student will be able to illustrate series and parallel circuits.				X	X			X	X				X	X				X		X															X



